the frequent clumps of the *Hibiscus grandiflorus*, or great-flowered mallow, which grows along the banks of streams, the border of ponds, or other moist places. This plant occurs more or less abundantly on nearly all the prairies of Richland, Lawrence, Wabash and Edwards counties, and perhaps throughout the state south of latitude 38° 25′. It is one of the most conspicuous plants of the prairie, for when in bloom, its large, crimson-centred white flowers sometimes measure nearly a foot in expanse.

THE GIGANTIC MAMMALS OF THE GENUS EOBASILEUS.*

BY PROFESSOR E. D. COPE.

A genus closely allied to the Proboscidea called Bathmodon, was recently (February, 1872) described by the writer as represented by remains of the Eocene Formations of Wyoming Territory. Investigations prosecuted during the present season, in the same region, under the direction of Prof. F. V. Hayden's Geological Survey of the territories, have resulted in a better acquaintance with these forms, and an approximation to a true estimate of their affinities.

The present genus, which is new and may be called *Eobasileus*,† is proven to be quite distinct from *Bathmodon* in the dentition of the premaxillary bone. It is narrow and edentulous and separated from its fellow by a deep notch. The front of the maxillary bone supports a tusk which represents the canine. It is shorter than in the walrus, but longer than in the sabre toothed tigers, and resembles the canines of the latter in being compressed and sharp-edged in front and behind. A long edentulous space follows the canine, before the molars commence. These are of relatively small size, and number 4 – 2. They all exhibit a single crescentic crest with angle inwards; but becoming straighter on the anterior teeth, where they are little curved. There is a single tubercle within the crescent, which with wearing soon becomes

* Read at the Dubuque Meeting of the American Association for the Advancement of Science. 1872.

† Proceedings of the American Philosophical Society, 1872, p. 485 (August 20).

confluent with the crescent giving a V-shaped surface on the premolars, or later a triangular one.

The general form of the cranium is remarkable. The temporal fossæ are latero-posterior, and there is a transverse supraoccipital crest. The zygomatic arches are posterior and the orbits not enclosed behind, nor with marked superciliary ridges. The muzzle is compressed and roof-shaped, and the frontal bones extend far in advance of the tusks, and even beyond the extremity of the long premaxillaries, overhanging them still more than in the rhinoceros. The margins of their extremities are flared upwards forming bony projections like shovels. These may have supported dermal horns as in the rhinoceros. These are composed externally of the maxillary, and internally of the nasal bones. Add to these, horns with stout osseous cores, one above each orbit, with approximated bases, and the curious physiognomy of the form becomes apparent.

The general form is massive, the ilia are wide and capacious and the limb bones exceedingly stout. The great trochanter is flat and thick; the fibular condyle well developed, and the astragalus little convex. The tarsus and foot are Proboscidian in character, and the short thick phalanges indicate the massive foot of a land animal.

There are three species of this genus known to the writer. The *E. cornutus* is known from many parts of the skeleton, including a nearly perfect cranium. This cranium measures over three feet in length and is in very perfect condition. The tusk is projected about a foot from its projecting alveolus and is recurved and covered on the distal half with smooth enamel. The horn-cores are a foot long, very stout, trihedral at base and with an enlargement on the inner side. The nasal projections viewed from above give the end of the muzzle a bilobed outline. The diameter of the pelvis measured between the crests of the ilia is nearly five feet. The long diameter of the proximal end of the femur is about ten inches. A sacral vertebral centrum is five inches in transverse diameter.

A second species is represented by some portions of the frontal bones. In this one the elevated margin is prolonged into a spatuliform process with a flattened convex extremity. The muzzle of this species when viewed from above is therefore bifurcate, hence the species is called *Eobasileus furcatus*.

A species different from the *E. cornutus* is represented by numerous remains. The most characteristic are the horn-cores, which are compressed at the base, somewhat acuminate and without inner enlargement. This may be called *E. pressicornis.*

The general form was stout and heavy, and less elevated than in the existing elephants. With proportions somewhat as in the rhinoceros, the species *E. cornutus* was larger than in any known species of that genus, being quite equal to the mastodons in bulk. This form will probably be found to be the predecessor in time of the huge forms of Proboscidians now known, and certain allies will be found to stand in the same relation to the odd and even-toed ungulates.

Remains of six of these huge quadrupeds were found in one locality in Southern Wyoming, and bones of at least twenty were found by the expedition.

Since the above was read at Dubuque it has been ascertained that the *E. pressicornis* and *E. furcatus* belong to the genus *Uintatherium*, having rudimental knobs instead of flat shovels on the nasal bones. This genus differs from *Eobasileus* in the rudimental character of the nasal horn-cores, and in the presence of an elevated lateral parietal crest. In *Eobasileus* the latter is almost wanting. They also differ in the character of the posterior (third) pair of horn-cores.

Subsequently, at a meeting of the Philadelphia Academy of Natural Sciences (January 14, 1873), the writer gave his reasons for regarding the genera *Eobasileus* and *Uintatherium* as Proboscidians constituting a peculiar family of the order, and his objections to referring them to a new order as has been proposed by Professor Marsh. He said he had first (August 20, 1872) *given reasons* for regarding them as *Proboscidea*, though Professor Marsh had previously referred one of them to *Mastodon* by name only. Some of the reasons are as follows:

1. The extreme shortness of the free extremity of the nasal bones.
2. The malar bone is rod-like, and forms the middle element of the zygomatic arch.
3. The cervical vertebræ are exceedingly short and transverse.
4. The radius crosses the ulna obliquely and leaves a large carpal surface to the latter beside it.
5. The femur is without third trochanter or fossa for the round ligament.
6. Its condyles are contracted and the intercondylar fossa is prolonged and fissure like.
7. The spine of the tibia is absent, and the glenoid cavities separated by a longitudinal keel.
8. The astragalus is not hour-glass shaped above, but with a uniform face.

9. The calcaneum is very short and largely inferior.
10. The phalanges represent several toes, and are very short and stout.

To these may be added three external characters, which directly result from the osteological, namely:

11. The possession of a proboscis. This is proven by the extreme shortness and stoutness of the free part of the nasal bones; by the very short cervical vertebræ, and by the fact that the nasal and premaxillary bones are deeply excavated at their extremities, with surrounding osseous eminences, for the origin of the muscles of the trunk.
12. The extension of the femur below the body, so that the leg was extended with the knee below and free from the body, as in elephants, monkeys and man.
13. The short subplantigrade foot, so different from the digitigrade character of other ungulates. The inferior surface of the calcaneum looks as though it furnished insertion for a ligamentous pad.

Other characters, common to *Proboscidea* and some other ungulates, are —

14. The scapula acuminate in outline above the spine, with a very short coracoid and alate spine.
15. Broad truncate occiput with widely separated temporal fossæ.
16. The greatly expanded iliac bones.

The presence of canine teeth and horns had been stated by Professor Marsh as characteristic of a new order. Neither of these were regarded by Professor Cope as sufficiently important for such an interpretation, since in Artiodactyles, and even in the Ruminant division, we have every variety of condition in both these points; *Moschidæ*, *Cephalophus* and *Hydropotes* were hornless, and some of these and some deer had canines. The wart hog has compound molars, no lower incisors and huge tusks. But the difference in this point from elephants he thought would disappear if, as was probable, the tusks of elephants should prove to be canines and not incisors. In these animals, as in *Eobasileus*, the tusk is enclosed between the maxillary and premaxillary, which is not the case with the outer incisors.

REVIEWS AND BOOK NOTICES.

THE GEOLOGY OF THE SEA BOTTOM.*—This is a very important contribution to the study of the bottom of the seas which is now receiving so much attention. Intended at first to be limited to an examination of the sea bottom of the French coast, it was gradually

* A. Delesse. Lithologie des Mers de France et des Mers principales du globe. Paris. Dec., 1871. 2 vols. 8vo. pp. 479; 135: 3 pls., folio with cuts in text.